PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.	:	10/750,693	Confirmation No. 4112
Applicant	:	Dan M. Manole	
Filed	:	January 2, 2004	
Title	:	MODULAR HEATING OR COOLING SYSTEM	
TC/A.U.	:	3744	
Examiner	:	Chen-Wen Jiang	
Docket No.	:	TEC1223-01 / C-513/540	
Customer No.:		00832	

APPEAL BRIEF

MAIL STOP APPEAL BRIEF-PATENTS
Assistant Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This Appeal is taken from the Examiner's decision dated December 7, 2006 in the above-identified patent application, rejecting Claims 10 and 13-16, by way of a Notice of Appeal filed on March 2, 2007. The $500.00 appeal brief fee was paid on July 28, 2006, Check No. 123188 and should be reapplied to this Appeal Brief. Submitted in conjunction with the present Appeal Brief is payment for a one-month extension of time.

In the event Applicant has overlooked the need for an additional extension of time, payment of fee, or additional payment of fee, Applicant hereby petitions therefor and authorize that any charges be made to Deposit Account No. 02-0385, Baker & Daniels.

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I. REAL PARTY IN INTEREST

The real party in interest is Tecumseh Products Company, a corporation organized and existing under the laws of the State of Michigan, having its principal place of business at 100 East Patterson Street, Tecumseh, Michigan 49286, and the assignee of the present application by virtue of an assignment from the inventor recorded on January 2, 2004 at Reel 014868, Frame 0722.

II. RELATED APPEALS AND INTERFERENCES

Neither the Appellant, the Appellants' representatives, nor the assignee know of any other appeals, interferences, or judicial proceedings which are related to, will directly affect, or be directly affected by, or have a bearing on, the Board's decision in the pending appeal.

III. STATUS OF CLAIMS

Pending:	Claims 4, 5, 7-24, and 26-30.
Canceled:	Claims 1-3, 6, 25, and 31-34.
Withdrawn:	None.
Allowed:	Claims 4, 5, 7-9, 11, 12, 17-24, and 26-30.
Objected to:	None.
Rejected:	Claims 10 and 13-16.
On Appeal:	Claims 10 and 13-16.

Claims 10 and 13-16 stand rejected under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 6,687,122 to Monfarad ("Monfarad '122") in view of U.S. Patent No. 6,493,223 to Viswanath ("Viswanath '223") or U.S. Patent No. 6,796,372 to Bear ("Bear '372").

Claims 10 and 13 are rejected under 35 U.S.C. §103(a) as obvious over Monfarad '122 in view of U.S. Patent No. 6,148,635 to Beebe et al. ("Beebe '635").

These rejections are appealed.

IV. STATUS OF AMENDMENTS

Claims 10 and 13-16 have not been amended since the Office Action dated December 7, 2006. The Notice of Appeal was filed on March 2, 2007. Claims 10 and 13-16 are set forth in the Claims Appendix.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention pertains to heating and cooling systems, particularly those for controlling the temperature of fluids, components, or items within an enclosure. The module heating and cooling system of the present invention may be used singularly, or in combination with other such modules connected in series or in parallel, to provide heating and/or cooling to a fluid medium or components within an enclosure to which the module is attached. Each module may be powered or replaced independently of any other of the modules, and provides a complete, self-contained refrigeration system unit by which heating or cooling may be effected. Each module includes a pair of cold plates having heat transfer surfaces, one from which heat is transferred to the module's refrigeration system, and the other to which heat is transferred from the module's refrigeration system. ¶ [0014].

Referring to Fig. 2, heating and cooling plates 22, 24, which function as first and second heat exchangers, are located on opposing sides of module 20 and are rigidly attached to a frame. ¶ [0029]. Plates 22, 24 include exteriorly facing heat transfer surfaces 26, 28, respectively. Disposed between and connected to plates 22, 24 to form a fluid circuit are hermetic refrigerant compressor 44, refrigerant receiver 48, and expansion device 50. ¶ [0029] - [0030]. Working fluid is received through the fluid circuit by refrigerant compressor 44 at low, substantially suction pressure. The working fluid is compressed by refrigerant compressor 44 to a high, substantially discharge pressure, increasing the temperature of the working fluid. Once compressed, the working fluid exits refrigerant compressor 44 and continues to travel through the fluid circuit. ¶ [0029]. The heated working fluid is circulated to plate 22 and the heat of the working fluid dissipated by surface 26. The working fluid than travels through an expansion device, which further cools the working fluid. ¶ [0031]. The now cooled working fluid is circulated to plate 24 where heat is transferred to surface 28 and absorbed by plate 24 and the working fluid. ¶ [0032]. Because of the design of module 20, simply reversing the relative orientation of module 20 with respect to the enclosure allows

both heating and cooling functions to be achieved, i.e., surface 26 or surface 28, respectively, may be placed in contact with the enclosure. ¶ [0033].

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Independent Claim 10, and Claims 13-16 which depend therefrom, stand rejected under 35 U.S.C. §103(a) as obvious over Monfarad '122 in view of Viswanath '223 or Bear '372.

B. Independent Claim 10, and Claim 13 which depends therefrom, are rejected under 35 U.S.C. §103(a) as obvious over Monfarad '122 in view of Beebe '635.

VII. ARGUMENT

A. Independent Claim 10, and Claims 13-16 depending therefrom, are not obvious over Monfarad '122 in view of Viswanath '223 or Bear '372.

Independent Claim 10 calls for a refrigeration system module comprising, *inter alia*, a heating plate; a cooling plate; an expansion device disposed between the heating and cooling plates; and a hermetic compressor assembly comprising a housing, an electric motor, and a compression mechanism, the compressor assembly *disposed between* the heating and cooling plates.

Advantageously, the placement of the hermetic compressor assembly between the heating and cooling plates allows for the heating and cooling plates to occupy substantially all of an exterior side of the module. This allows for not only better utilization of the available exterior surface, but also facilitates a more efficient transfer of thermal energy.

Applicant respectfully submits that independent Claim 10 is not rendered obvious over Monfarad '122 in view of Viswanath '223 or Bear '372. In forming this rejection, the Examiner indicates that "Monfarad ['122] discloses the invention [of Claim 10] substantially as claimed." Page 3, Office Action of December 7, 2006. Monfarad '122 discloses a heat sink module 60, shown in Figs. 3 and 4, including compressor 12, condenser 14, and evaporator 20. Compressor 12 is positioned adjacent to condenser 14 and evaporator 20, i.e., the heating and cooling plates of heat sink module 60. However, Monfarad '122 does not explicitly or implicitly disclose *disposing the compressor assembly **between** the heating and cooling plates* as required by independent Claim 10.

In view of the teachings of Monfarad '122, a person of ordinary skill in the art would not position compressor 12 *between* condenser 14 and evaporator 20. In fact, Monfarad '122 teaches away from positioning compressor 12 *between* condenser 14 and evaporator 20. Referring to the disclosure of Monfarad '122, an advantage of the device of Monfarad '122 is the creation of a "compact" system, col. 3, line 49, that can be sized to "fit within a rack unit of a conventional computer server or a telecommunications rack." Col. 9, lines 6-7. Placement of compressor 12 between condenser 14 and evaporator 20, i.e., the heating and cooling plates, would require increasing the distance from one heat exchanger to the other. This increased distance between condenser 14 and evaporator 20, shown in Figs. 3 and 4 of Monfarad '122, would increase the size of the unit, preventing it from fitting within a conventional computer server or telecommunications rack, rendering the device incapable of being used in its disclosed applications. Accordingly, a person having ordinary skill in the art would clearly recognize from the figures and the above-identified disclosure the intended applications of Monfarad '122. Such recognition by a person having an ordinary skill in the art creates a clear disincentive to place the hermetic compressor between the heating and cooling plates.

In the Examiner's Office Action, dated December 7, 2006, rejecting Claims 10 and 13-16, the Examiner stated, "The size and design of prior art liquid-based cooling system [sic] often required the major components of the prior art liquid-based cooling system be centrally located," referring to column 2, lines 19-22 of Monfarad '122. Pages 3 and 4, Office Action dated March 7, 2006. The Examiner then relied on the above-identified citation in a manner incompatible with the entire disclosure of Monfarad '122, i.e., that Monfarad '122 acknowledges designing refrigeration system modules with the "major components" between the heating and cooling plates. When read in its entirety, Monfarad '122 does not disclose disposing a hermetic compressor between the heating and cooling plates of a refrigeration system module. In fact, the entire sentence of Monfarad '122, only a portion of which is relied on by the Examiner, states, "In addition, the size and design of prior art liquid-based cooling systems often required that the major components of the prior art liquid-based cooling system be centrally located, **typically remote from the electronic devices to be cooled, and that a complicated system of tubing or 'plumbing' be used to bring the cooling liquid into thermal contact with the heat source, i.e., with the microprocessor, multi-chip module, or other integrated circuit**." Col. 2, lines 16-26. Further, Monfarad '122 continues, "Consequently, unlike prior art air-based cooling systems, prior art liquid-

based cooling systems were not modular, were not self-contained, and often required special expertise and tools for maintenance and operation." Col. 2, lines 26-29.

When taken in context, Monfarad '122 simply identifies a problem in the prior art, i.e., the need to locate major components of a liquid-based cooling system a significant distance from the devices to be cooled. The portion of Monfarad '122 cited by the Examiner does not provide motivation to dispose a hermetic compressor assembly between the heating and cooling plates of a refrigeration system module as required by independent Claim 10. In fact, the entire disclosure of Monfarad '122 further emphasizes its compact design. This compact design allows the module of Monfarad '122 to be "self-contained and . . . have physical dimensions similar to . . . air-based cooling systems" that, as a result, avoid "the need for significant system housing modification or the 'plumbing' associated with prior art liquid-based cooling systems." Col. 3, lines 17-23. Disposing the hermetic compressor assembly between the heating and cooling plates of Monfarad '122 would cause the module to exceed the physical dimensions of air-based cooling systems, which, as discussed above, would make the module incompatible with several of its intended applications. Additionally, disposing the compressor assembly between the heating and cooling plates of Monfarad '122 would require the same "significant system housing modification" that the compact design of Monfarad '122 seeks to avoid. Col. 3, line 21. Therefore, the disclosure cited by the Examiner, when taken in context, further teaches away from placing the hermetic compressor of Monfarad '122 between the heating and cooling plates, as required by independent Claim 10.

Further, Applicant agrees with the Examiner's previous observation that the use of the word "typically", with respect to the location of the major components of the prior art liquid-based cooling system being "typically remote from the electronic devices to be cooled", does not *require* that the major components be remote from the electronic devices to be cooled. Advisory Action dated May 12, 2006, page 2; Monfarad '122, col. 2, lines 18-26. In fact, Monfarad '122 is itself a refrigeration module in which the major components of the cooling system are located within the vicinity of, and are not "remote from", the electronic devices to be cooled. Col. 3, lines 35-47. However, simply stating the *typical* location of components of the prior art systems does not disclose, explicitly or implicitly, positioning the components in any other location. Therefore, while the disclosure of Monfarad '122 does not explicitly preclude all possible locations for the major components of a liquid-based cooling system by *requiring* that the major components be positioned "remote from" the devices to be cooled,

Monfarad '122 does, for the reasons set forth above, teach away from disposing the compressor assembly between the heating and cooling plates as required by independent Claim 10.

In forming the rejection, the Examiner indicated that Monfarad '122 fails to disclose or suggest a "plate with fin type condenser" and then relies on the disclosures of either Viswanath '223 or, alternatively, Bear '372 for providing the same. Page 4, Office Action dated December 7, 2006. However, the limitation of a "conductive heat exchange plate having a plurality of fins" is called for dependent Claim 15 of the present application. Therefore, the Examiner's additional citation of Viswanath '223 or, alternatively, Bear '372 is inapplicable to independent Claim 10.

Because the combination of Monfarad '122 and Viswanath '223 or, alternatively, Bear '372 do not disclose or suggest all the limitations of independent Claim 10, Applicants respectfully submit that independent Claim 10, and Claims 13-16 which depend therefrom, are not rendered obvious by the combination of these references.

B. Independent Claim 10, and Claim 13 which depends therefrom, are rejected under 35 U.S.C. §103(a) as obvious over Monfarad '122 in view of Beebe '635.

As set forth above, independent Claim 10 calls for a refrigeration system module comprising, *inter alia*, a heating plate; a cooling plate; an expansion device disposed between the heating and cooling plates; and a hermetic compressor assembly comprising a housing, an electric motor, and a compression mechanism, the compressor assembly *disposed between* the heating and cooling plates.

Advantageously, the placement of the hermetic compressor assembly between the heating and cooling plates allows for the heating and cooling plates to occupy substantially all of an exterior side of the module. This allows for not only better utilization of the available exterior surface, but also facilitates a more efficient transfer of thermal energy.

Applicant respectfully submits that independent Claim 10 is not rendered obvious over Monfarad '122 in view of Beebe '635. The disclosure of Monfarad '122 is set forth above. For at least the reasons set forth above with respect to independent Claim 10 and the disclosure of Monfarad '122, Monfarad '122 fails to disclose or suggest a compressor assembly *disposed between* the heating and cooling plates. The Examiner's additional citation of Beebe '635 fails to overcome this deficiency as a person of ordinary skill in the art would not, in view of the teachings of Beebe '635 and Monfarad '122, modify the device

disclosed in Monfarad '122 to dispose the compressor between the heating and cooling plates.

Beebe '635 discloses heat transfer device 8, shown in Fig. 1, having condenser 10, compressor 14, and evaporator 17. Compressor 14 is formed by top compressor wafer 14a, flexible diaphragm 14b, and bottom compressor wafer 14c. Electrical stimulation of diaphragm 14b compresses refrigerant within compressor 14, forcing it through a closed loop defined between compressor 14, condenser 10, and evaporator 17. The design of Beebe '635 is an improvement over the "well known vapor-compression cycle cooling technology [which] poses serious structural impediments to size reduction that, for the most part, have yet to be overcome." Col. 1, lines 28-30.

Beebe '635 attempts to overcome the structural impediments of the typical compressor assembly, such as that disclosed in the current application, by providing the above-described compressor design utilizing a "microcooling approach, i.e. localized cooling as differentiated from macrocooling of a large environment." This approach allows the heat transfer device of Beebe '635 to have a "physical embodiment similar to integrated circuit packaging", with overall dimensions of 100 mm by 100 mm by 2.75 mm. Col. 2, lines 18-19; col. 4, table 1. In contrast to the "microcooling" provided by the heat transfer device of Beebe '635, conventional systems occupy much larger volumes to provide "macrocooling." These systems, according to Beebe '635, are "highly efficient, but awkward and heavy, relegating their use to a very limited number of applications." Col. 1, line 67-col. 2, line 2.

To position the hermetic compressor of Monfarad '122 between the heating and cooling plates disclosed therein would be in contravention of the teachings of both Beebe '635 and Monfarad '122. Beebe '635 is specifically designed to overcome the "structural impediments" of the "awkward and heavy" compression systems typically used in cooling applications, i.e., the type of hermetic compressor assembly used in Monfarad '122. Col. 1, line 29; col. 2, line 1. Further, as discussed above, an advantage of the device of Monfarad '122 is the creation of a "compact" system, col. 3, line 49, that can be sized to "fit within a rack unit of a conventional computer server or a telecommunications rack." Col. 9, lines 6-7. Placement of compressor 12 between condenser 14 and evaporator 20, i.e., the heating and cooling plates, would require increasing the distance from one heat exchanger to the other. This increased distance between condenser 14 and evaporator 20, shown in Figs. 3 and 4 of Monfarad '122, would increase the size of the unit, adding the very "structural impediments" that the device of Beebe '635 attempts to overcome. Further, by increase the size of the device of Monfarad '122, it would be prevented from fitting within a conventional computer

server or telecommunications rack, rendering the device incapable of being used for its disclosed applications. Accordingly, a person having ordinary skill in the art would clearly recognize from the benefits of the devices disclosed in Beebe '635 and Monfarad '122. Such recognition by a person having an ordinary skill in the art creates a clear disincentive to place the hermetic compressor between the heating and cooling plates.

Because the combination of Monfarad '122 and Beebe '635 do not disclose or suggest all the limitations of independent Claim 10, Applicants respectfully submit that independent Claim 10, and Claim 13 which depends therefrom, are not rendered obvious by the combination of these references.

VIII. CONCLUSION

Appellant respectfully requests reversal of the Examiner's rejection, and allowance of the claims.

Respectfully submitted,

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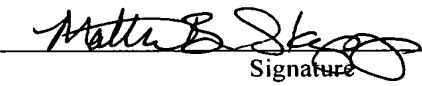

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June 4, 2007
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IX. CLAIMS APPENDIX

10. (original): A refrigeration system module, comprising:

a frame;

a heating plate having a fluid inlet and a fluid outlet and a first heat transfer surface;

a cooling plate having a fluid inlet and a fluid outlet and a second heat transfer surface;

an expansion device disposed between said heating and cooling plates and in fluid communication with said heating plate fluid outlet and said cooling plate fluid inlet; and

a hermetic compressor assembly comprising a housing, an electric motor and a compression mechanism, said compression mechanism being driven by said motor, said compressor assembly disposed between said heating and cooling plates and having a discharge outlet in fluid communication with said heating plate fluid inlet, and a suction inlet in fluid communication with said cooling plate fluid outlet;

wherein said heating plate, said cooling plate, said expansion device and said compressor assembly are fixed to said frame, and said first and second heat transfer surfaces each at least partially define an exterior surface of said module.

13. (original): The module of claim 10, further comprising a refrigerant receiver interconnecting said heating plate fluid outlet and said expansion device.

14. (original): In combination with the module of claim 10, a cold plate having a third heat transfer surface in conductive communication with one of said first heat transfer surface and said second heat transfer surface, said cold plate having a fluid inlet and a fluid outlet.

15. (original): In combination with the module of claim 10, a conductive heat exchange plate having a third heat transfer surface in conductive communication with one of said first heat transfer surface and said second heat transfer surface, said conductive heat exchange plate having a plurality of fins.

16. (original): The combination of claim 15, wherein said third heat transfer surface and said one of said first heat transfer surface and said second heat transfer surface are of matching areas.

X. EVIDENCE APPENDIX

None.

XI. RELATED PROCEEDINGS APPENDIX

No proceedings which are related to, will directly affect or be directly affected by, or have a bearing on, the Board's decision in the pending appeal are known to the Appellants', the Appellants' representatives, or the assignee.